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Flora should be that work. It is among the young, among those beginning to take an interest in the plant creatures of their vicinage, that this book will yield the very best results. The figures add so much to the attractiveness of the descriptions that plant-analysis, even as it used to be conducted, could hardly be so dry and profitless as we have been accustomed to believe it. Such books make botanists everywhere respect the botanical advancement of America.

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L' Année psychologique. 2me Année, 1895. Publiée par MM. H. BEAUNIS et A. BINET. Alcan, Paris. 1896. Pp. 1010.

This *Année* is two-thirds larger than it was a year ago. In the value of its original contributions and the thoroughness and helpfulness of its analyses it has at least not fallen below its high standard. Its perusal leaves an impression of immense and fruitful industry on the part of M. Binet and his fellow-workers, who have made it an indispensable aid to all interested in the field it covers. Its contents include 16 original articles (pp. 1-500); analyses of about 240 books and articles of the year (pp. 501-912), for the most part brief and just, though also some important ones of considerable length and a bibliographical index of 1394 titles, which, by special arrangement, is the same as that published by *The Psychological Review*.

The original contributions alone will be briefly summarized.

A. Articles by various contributors.

(1) TH. RIBOT: *Abnormal and Morbid Characters*. (Pp. 1-17.) M. Ribot is one of several French thinkers—Perez, Paulhan, Fouillée—who have recently attempted classifications of temperaments or characters. An analysis of their systems appears later in this *Année*, pp. 785-793. M. Ribot here calls particular attention to Seeland's hierarchical division into the strong (gay and calm), the neutral and the weak (melancholic, nervous and choleric), in which the former are more perfect, the latter approach more nearly to the abnormal. The truly abnormal he then divides into (1) successive contradictory characters; (2) coexisting contradictory characters; (3) unstable or polymorphous,

'infantile' characters. Each class is further subdivided and described.

(2) A. FOREL: *Comparative Psychology*. (Pp. 18-44.) A vigorous protest against "transferring the content of our superior consciousness into the acts of insects and of animals in general, with the partial and very reserved exception of the highest mammals." This tendency "arises from two confusions, first that of instinct with plastic reasoning, and second that of a series of acts observed in the animal with the psychological subjectivity of the animal." Nervous centers can act in two different ways to arrive at the same end: (a) automatically; (b) in the adaptive or plastic manner, which we call intelligence or reason. For the latter is demanded the inheritance of a much larger number and complexity of neurons than for the former. Man is highly plastic, though he has also inherited automatisms more or less complete. The social instinct of insects, especially of ants, belongs to the category of complete inherited automatisms, which do not need to be learned; yet these insects show also some small degree of adaptive activity. In studying them "we should content ourselves with exact biological observations and note carefully the facts of plastic and of automatic activity, endeavoring to understand and appreciate them as thoroughly as possible." So-called comparative psychology should be made rather a comparative biology.

(3) TH. FLOURNOY: *Note on times of reading and of omission*. (Pp. 45-53.) It takes twenty-five per cent. longer to omit the names of a class of objects A and pronounce the non-A's than to pronounce the A's and omit the non-A's in lists of equal length, where both appear an equal number of times. This is due to an antecedent subexcitation of the images, visual and articulatory, belonging to the concept A, and the impossibility of such subexcitation for all non-A's. There can be no actual concept, aside from its verbal formula, of an indefinite class non-A.

(4) B. BOURDON: *Investigation into intellectual phenomena*. (Pp. 54-69.) A study of the comparative frequency of different kinds of association. Most frequently aroused are verbal or non-verbal images; the latter by the more con-

crete words, the former by words which designate more abstract ideas. Besides these, there may be in rarer cases a complete absence of images, a vague feeling of knowing a name or word, or a feeling of the meaning of a word. Abstract ideas are essentially constituted by verbal images.

(5) E. GLEY: *Study of some conditions favoring hypnotism of animals.* (Pp. 70-78.) Describes experiments with young and with enfeebled frogs, and infers: (1) that there is greater danger in hypnotizing children than older persons; (2) that the ideas of the Nancy school must be modified by admitting somatic as well as psychic influences in producing hypnosis.

(6) VAN BIERVLIET: *Measurement of illusions of weight.* (Pp. 79-86.) Shows that when we know the volume of an object, by sight or touch, we estimate not its absolute weight, but its density; and concludes, as against Flournoy and others, that this proves the existence of the much-disputed 'sense of innervation.'

B. Studies from the Psychological Laboratory of Paris.

(1) BINET and COURTIER: *The capillary circulation of the hand; its relation to respiration and to mental processes.* (Pp. 87-167.) An important study, very carefully and thoroughly conducted. After describing their method and the various sources of error which must be eliminated or allowed for, the authors discuss the influences exerted by various psychical phenomena—state of repose, sensory stimulation, mental calculation and the emotional state which accompanies it—upon the capillary circulation, the arterial circulation and the respiration. These influences are very marked, but vary greatly in different individuals. In some the vaso-motor reaction is strong and quick; in others it is slow, weak or even wanting. In some it is absolutely regular; in others there is constant capillary activity and irregularity even in repose. In some the various mental processes modify most strongly the respiration (more rapid, shallow, regular, with suppression of expiratory pause); in others the heart (increased rapidity, diminished force of propulsion); in others the vaso-motor system, either arterial (increase of tension, often vaso-constriction, greater clearness of respiratory undulations) or capillary

(disappearance of respiratory undulations, less amplitude of pulsations, change in form of pulsation, vaso-constriction). The influence of emotion has as yet been little studied, but the fact that in case of a sudden shock of surprise the emotion is at its height almost uniformly before the vaso-motor reaction has begun, shows that Lange gave too great prominence to vaso-motor phenomena in the mechanism of emotion.

(2) V. HENRI: *Experiments in the localization of tactile sensations.* (Pp. 168-192.) A study by various methods, and with a record of introspective observations, of the accuracy of tactile localization. Certain prominent parts of the bodily surface—folds of skin, protuberances of bone, joints, etc.—are selected by most subjects as points-de-repère, with reference to which other localizations are made. The direction of error is usually toward the point-de-repère made use of; the degree of error is less, the more points-de-repère there are near the point touched, and the more characteristic the quality of the contact. The least distance at which two simultaneously stimulated points of the skin can be distinguished as two, is not a measure of accuracy in localization. Quality of contact and movement of part touched are essential factors in localization.

(3) P. XILLIEZ: *Continuity in the immediate memory for figures and numbers in auditory series.* (Pp. 193-200.) Not all series of numbers are equally easy to memorize. The size of the differences between the successive numbers of the series has much influence. There is a tendency, especially marked in children, to diminish the size of these intervals, an approach toward continuity, especially ascending continuity, in the series.

(4) BINET and COURTIER: *Graphic Investigation of Music.* (Pp. 201-222.) Describes a registering apparatus for recording variations in force, rate, intervals, form, combinations and successions of notes and other details of a performance. Besides its value to the musician, the apparatus is admirably adapted to the psychological study of complex voluntary movements.

(5) BINET: *Fear in Children.* (Pp. 223-254.) Discusses, as a result of actual observations, the various objects and circumstances which excite

fear; its bodily effects and expression; its relation to health (the weak are more subject), to intellectual development (no relation), and to development of imagination (active imaginations are more subject); the proportion of children subject to it (all, in some degree; exceptionally, about 10 per cent. of boys and 30 per cent. of girls, by rough estimate); the influence of contagion, over-excited imagination, ill-treatment, in its production; and the best method of cure. As to cure, the method must vary; in some cases the best means is attention to the state of health; in others, the naturally curative effect of time; in others, moral treatment. For the latter the most important precepts are: Avoid corporal punishment, threats and mockery; suppress the circumstances which produce fear; guard against over-excitement of imagination; give the child self-confidence; train him gradually and progressively in acts of courage.

C. General Reviews.

(1) DR. AZOULAY: *Recent theories, histological and mechanical, of the functioning of the central nervous system.* (Pp. 255-294.) A resumé of the present state of knowledge in regard to the structure of the nervous system, followed by a detailed exposition and criticism of the theories as to its mechanism recently advanced by Rückardt, Lepine, Duval and Cajal.

(2) V. HENRI: *The sense of locality of the skin.* (Pp. 295-362.) Reviews the literature of the subject and the results of experiment, from the time of Weber (1834) to the present; and gives a bibliography of 156 titles.

(3) J. PASSY: *Olfactory sensations.* (Pp. 363-410.) An account of the as yet very incomplete researches in this field.

(4) BINET and HENRI: *Individual Psychology.* (Pp. 411-465.) Insists on substituting for the a priori classifications of characters which have heretofore prevailed, deductions from actual measurements of individual differences in fundamental mental processes. Gives a brief historic summary of the questions thus far studied in individual psychology; and maintains that investigations in this field have confined themselves largely to sensations, whose individual differences are slight and insignificant compared with those of the higher mental processes. A series of more fundamental tests is recommended

which include: memory—for geometrical forms, for paragraphs, for music, colors, series of figures nature of mental images; imagination, passive and constructive; attention, its duration, extent, concentration; power of understanding, observing, defining and distinguishing; suggestibility; æsthetic feeling; moral feeling; muscular force and force of will; motor ability and accuracy of estimates made by the eye. Explicit directions are given for each of these.

(5) V. HENRI: *The calculation of probabilities in psychology.* An able paper, developing formulæ for the calculation of such probabilities as have importance for psychology: determination of averages, of the possibility, nature and laws of variations from the average, of probable errors, of the existence of causes other than pure chance in certain results, etc. The author criticises current interpretations of veridical death-coincidences, and of 'thought-reading' experiments, and more at length the methods of calculation used for many psychological investigations.

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The Gas and Oil Engine: By DUGALD CLERK. Sixth Edition, revised and enlarged. New York, John Wiley & Sons. 1896.

This important work was first issued ten years ago by its author, who was at once recognized as an authority on the subject chosen for his study. Mr. Clerk is an engineer of large experience in this field, an inventor of great talent, and a builder of steam and gas-engines of reputation and success. He has, in this work, given to his profession and to the public an admirable account, historical, scientific and practical, of this remarkable and increasingly important class of heat-engines which is at once one of the most complete, accurate and detailed yet published. It has found a large sale in this country as well as in Europe, and constitutes one of the most generally satisfactory and useful of all existing treatises on the subject in any language. While not as complete in its collection of working drawings for use in the engine-builder's establishment as is the work of Mon. Richard, and while in some respects less elaborate in some portions of its purely scientific discussion of the theory of the